

CLAIMS

1. A method of controlling a first rate of transmission of packets at a station, the station
5 coupled to at least one other station coupled in a ring arrangement, the method
comprising the steps of:

determining a credit bandwidth of the at least one other station, the credit
bandwidth corresponding to a second rate of transmission of packets allocated to the
at least one other station;

10 transmitting available packets at the station to downstream stations in the
network; and

reserving bandwidth for the at least one other station for each available packet that
transits the at least one station, wherein an amount of reserved bandwidth is
determined in accordance with the credit bandwidth of the at least one station.

- 15 2. The method of claim 1, wherein the step of periodically provisioning bandwidth to the
at least one station comprises the step of transmitting tax packets to the at least one
other station for each packet that transits through the at least one station, wherein a
number of the tax packets corresponds to the credit bandwidth of the at least one other
20 station.

3. The method of claim 1, wherein the credit bandwidth is determined according to a
reserved bandwidth of the at least one other station.

4. The method of claim 1, wherein the credit bandwidth is determined according to a guaranteed bandwidth of the at least one other station.
5. The method of claim 1, wherein the credit bandwidth is determined according to a weight of the at least one other station.
6. The method of claim 1, wherein the tax packets comprise dummy packets.
7. The method of claim 1, further comprising the step of adjusting the credit bandwidth allocated to the at least one other station in response to an actual rate of transmission of packets the at least one other station.
8. The method according to claim 1, wherein an intermediate station is disposed between the station and the at least one other station, the intermediate station allocated an intermediate bandwidth credit, the method comprising the steps of provisioning a bandwidth to the intermediate station corresponding to the intermediate bandwidth for each transmission to the at least one other station that transits through the intermediate station.
9. The method of claim 2, wherein an intermediate station is disposed between the station and the at least one other station, and an intermediate credit is allocated to the intermediate stations, wherein the number of the tax packets transmitted by the station

corresponds to a sum of the intermediate credit and the credit bandwidth of the at least one station.

10. A method for controlling a transmission of packets by a station coupled to a plurality of other stations in a ring arrangement comprising:

storing a value for each of the other stations, the value associated with a bandwidth allocated to the other station; and

selecting between a first packet and a second packet for transmission to downstream station in response to the values associated with of each of the other stations.

11. The method of claim 10, wherein the first packet comprises information sourced by the station, the second packet comprises a tax packet and the method includes the step of summing the values associated with each of the other stations disposed between the station and a destination station to provide a total tax number.

12. The method according to claim 11, including the step of forwarding, for each packet sent to the destination station, a number of tax packets corresponding to the total tax number.

13. The method according to claim 12, further comprising the step of reserving bandwidth by the station.

14. The method according to claim 13, wherein the step of reserving bandwidth by the station comprises the step of transmitting, by the station, a Hole packet comprising a source and destination address of the station.

5 15. An apparatus for controlling a transmission of packets by a station coupled to a plurality of other stations in a ring arrangement comprising:

a table comprising an entry for each of the other stations, the entry comprising a value associated with a bandwidth allocated to the other station; and selection logic for selecting between a first packet and a second packet for transmission to a neighbor station, the selection logic operating in response to the values of each entry in the table.

10 16. The apparatus of claim 15, wherein the first packet comprises information sourced by the station, and the second packet comprises a tax packet.

15 17. The apparatus of claim 16, wherein the selection logic includes logic for summing the values of the entries in the table associated with stations disposed between the station and a destination station to provide a total tax number.

20 18. The apparatus of claim 17, wherein the selection logic includes a mechanism for transmitting a number of second packets corresponding to the total tax for each first packet transmitted to the destination station.

19. The apparatus of claim 18 comprising a feedback datapath for each entry in the table, the respective feedback datapaths for providing adjusted tax values in response to a profile of bandwidth used at each of the other stations.

5 20. The apparatus of claim 15, further comprising a usage map, comprising an entry for each of the other stations and for storing information associated each respective one of the other stations.

10 21. The apparatus of claim 20, wherein the information is an actual packet transmission rate of the associated station.

22. The apparatus of claim 20, further comprising means for adjusting at least one value in the table in accordance with the usage map.

15 23. The apparatus of claim 15 including means for reserving bandwidth for future use by the station.

24. The apparatus of claim 23, wherein the means for reserving comprises a Hole packet having a source and destination address corresponding to the station.

20 25. The apparatus of claim 24, wherein the Hole packet optionally includes data destined for another station on the ring.

26. A ring network architecture comprising:

a plurality of stations coupled by at least one unidirectional ring;

means for ensuring access to the unidirectional ring by each one of the plurality of stations comprising:

a table, at each one of the plurality of stations, for storing a reserved bandwidth of each of the other ones of the plurality of stations;

means, at a first station in the ring, for selecting either a packet destined for a second station in a ring or a tax packet for transmission by the first station, the means for selecting operating in response to the reserved bandwidths of any station disposed between the first station and the second station in the ring.

27. The ring network architecture of claim 26 wherein the stations in the ring are coupled according to a resilient ring packet architecture.

28. The ring network architecture of claim 26, further comprising a feedback datapath for forwarding an actual bandwidth usage of each one of the plurality of stations in the ring to the other ones of the plurality of stations.

29. A station in a unidirectional ring architecture comprising:

means for guaranteeing bandwidth to a downstream station that is downstream from the station on the unidirectional ring, including means for allocating a determined number of transmit slots to the downstream station for each packet that transits through the downstream station.

30. The station of claim 29, wherein the means for allocating a determined number of transmit slots to the downstream station comprises:

means for storing a tax value for each one of a plurality of other stations in the unidirectional ring;

means for determining a total tax associated with forwarding packets from the station to the downstream station.

31. The station of claim 30, wherein the means for determining the total tax comprises:

means for determining which ones of the plurality of other stations in the unidirectional ring are disposed between the station and the downstream station;

means for summing the tax values of each of the plurality of other stations that are determined to be between the station and the downstream station to provide the total tax

32. The station of claim 30, further comprising means for forwarding, for each packet transferred between the station and the downstream station, a number of tax packets corresponding to the total tax.

33. The station of claim 30 further comprising feedback means, for receiving bandwidth usage associated with at least one other station and for adjusting the stored tax value the at least one other station.

34. A method of guaranteeing bandwidth to a downstream station that is downstream from a station in a ring arrangement, including the step of:

allocating a determined number of transmit opportunities to the downstream station for each packet that transits through the downstream station.

5

35. The method of claim 34, wherein the step of allocating a determined number of transmit opportunities to the downstream station includes the steps of:

storing a tax value for each one of a plurality of other stations in the unidirectional ring; and

10

determining a total tax associated with forwarding packets from the station to the downstream station.

36. The method of claim 35, wherein the step of determining the total tax comprises:

determining which ones of the plurality of other stations in the

15

unidirectional ring are disposed between the station and the downstream station; and

summing the tax values of each of the plurality of other stations that are determined to be between the station and the downstream station to provide the total tax.

20

37. The method of claim 36, further comprising the step of forwarding, for each packet transferred between the station and the downstream station, a number of tax packets corresponding to the total tax.

38. The method of claim 37 further comprising the step of receiving bandwidth usage associated with at least one other station and for adjusting the stored tax value the at least one other station.